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*presented by the author.*





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FROM my experience in appendiceal work, particularly during the past year, I feel justified in making a further contribution upon this much-debated subject. Notwithstanding the vast amount of literature which has appeared and the numerous discussions which have occurred upon this subject in the past twelve months, I regret to say that there are yet too many who are doubtful as to the prevalence of the affection and the importance of the only curative treatment, namely, operation. I had hoped that the nomenclature of this subject had been definitely settled and that appendicitis was the accepted term for inflammation in the right iliac fossa, which we now know invariably originates within the appendix, but a recent article by Frederick Treves in the *British Medical Journal* describes appendicitis under the headings typhlitis and perityphlitis, terms which are no longer accepted by American surgeons.

The etiology and pathology of appendicitis being intimately associated, I have thought it best to describe them together.

From my experience in the past year I have no reason to change the views expressed in the former articles regarding the etiology of this affection. I still believe that there is a certain proportion of cases of appendicitis in which foreign bodies are an active factor in its production, when a catarrhal condition of the mucous membrane already exists, and especially when associated with the bacterium commune coli. Foreign bodies may, however, remain and cause little or no disturbance until some indiscretion in diet or exposure to cold or dampness excites a catarrhal condition, when their presence adds to the irritation thus produced and prevents drainage of the organ by occluding its lumen. They are the important factors which favor ulceration of the walls of the appendix and perforation or even gangrene of the entire organ.

Occlusion of the lumen of the appendix may also result from one of the following conditions: a very long meso-appendix, a shortened meso-appendix due to infiltration, a meso-appendix containing an excess of fat; adhesions; thickening of the mucous and submucous coats or displacement of adjacent viscera.

All inflammations of the appendix are septic; consequently drainage is essential for a spontaneous recovery from an attack. The mucous membrane of an appendix beyond the point of obstruction undergoes struc-





tural changes which render otherwise innocuous materials (bacteria, etc.) actively malignant and thus favor migration.

In cases of chronic appendicitis, a catarrhal condition of the mucous membrane of the appendix primarily renders it predisposed to slight irritation, and although macroscopically and microscopically the mucous membrane of such an appendix would show but little evidence of disease, the clinical history would demonstrate otherwise. I have seen cases of recurrent appendicitis in which all the symptoms disappeared after the removal of the appendix, which when examined showed but slight disease of the mucous membrane.

I recall one case in particular in which the patient had been an invalid for seventeen years. The removal of the appendix, which was small, and the mucous membrane of which showed but slight pathological changes, was followed by a prompt disappearance of the symptoms. This patient to-day is perfectly well and leading a comfortable and happy life.

Many of the cases of chronic intestinal indigestion of both the catarrhal and the nervous type, also cases of chronic entero-colitis and colitis, I maintain, are due to structural changes found in the appendix, which I have removed for the relief of one or more of these various conditions.

The appendix is a highly organized structure, as much so as is any portion of the alimentary canal. It possesses the same number of coats, has its individual mesentery, and is equally as well supplied with bloodvessels, nerves, and lymphatics, as are the intestines.

The point of essential difference, however, is that it has but one opening, and this is the reason that inflammations of this organ are of so destructive a character and hold a place second to no other intra-abdominal inflammation.

Catarrhal inflammations of the appendix are very common, but heretofore they have not been recognized as attacks of appendicitis. When the inflammation is more marked there are other factors which enter into the case. If the *bacillus communis coli* is present in a virulent form or is associated with the *staphylococcus*, we have an infective appendicitis which is of the virulent type; when this condition is associated with a fecal concretion or other foreign body causing pressure, necrosis occurs and perforation results. In infective appendicitis we frequently find minute points of suppuration in the mucosa; these foci start in the glands which are infected and then suppurate. The virulent bacilli can and do migrate through the walls of the inflamed appendix and cause suppuration around the organ without perforation.

The termination of an attack of the infective variety of appendicitis depends upon the direction which the bacilli take. If they pass into an appendix whose lumen is not encroached upon, the attack may terminate favorably. If the migration is through the walls into the right iliac fossa, suppuration about the organ occurs and we have a periappendiceal abscess, or a general infective peritonitis. It is this uncertainty concerning the course which the disease may pursue which places upon the phy-

sician the terrible responsibility of making an early and correct diagnosis, thus affording opportunity for early operative interference. In support of this position I will simply refer you to the statistics of the early operative treatment in comparison with those of the so-called conservative or expectant treatment.

This is the view I have held, and, when the opportunity has presented itself, acted upon, and I have yet to record the first death where the appendix was removed in the early stage of the acute attack.

The personal equation in the resistance to septic absorption is a matter of the greatest importance and one which figures conspicuously in appendicitis. Two cases, in which there is, as nearly as it is possible to demonstrate pathologically, a parallel condition of affairs, may show very different degrees of infection; one patient will be profoundly septic, while the other will show but slight evidences of poisoning. This fact must be understood and borne in mind by the physician in attendance upon a case of appendicitis; otherwise he will be less likely to appreciate the responsibility of his position.

As I have before remarked, the diagnosis of appendicitis is not a difficult one to make. This statement has, to my astonishment, been attacked by a few prominent clinicians. The history of the onset in the great majority of cases of acute appendicitis, as well as in acute attacks supervening upon an already chronically inflamed organ, presents a picture, the outlines of which are so striking that if once seen it must be everlasting.

The initial pain, the gastric disturbance, the point where the tenderness to touch is most intense, the torpid bowel, all these following closely upon, either the ingestion of indigestible substances or the ingestion of digestible substances, if the integrity of the lining membrane of the digestive track has been disturbed as by sudden exposure to cold, fright, grief, etc., these symptoms form the background of such a picture.

The rigidity of the abdominal walls of the lower right quadrant of the abdomen, nausea if not vomiting, the disposition to flex the thighs upon the abdomen, the limited abdominal respiration, the increased pulse-rate, the elevation of temperature, the intense thirst, the pain referred to the back, the abdominal distention, complete the picture in detail. There is now left the finishing touch, which is true in both senses of the word, that of locating the inflamed organ by palpation. While the tenderness early in the attack is diffuse, yet the point of greatest tenderness can, by careful examination, be most clearly defined over the position held by the appendix.

The *initial* pain occurring in acute appendicitis is more frequently located at other points in the abdomen than in the right iliac fossa, and this may mislead the physician in the diagnosis unless it is associated with other prominent symptoms.

The symptoms of appendicitis present such a vivid picture clinically that I cannot conceive how ordinarily they could be misinterpreted.



The cramp-like pain in the epigastric or umbilical region, which ushers in the initial symptoms of this affection, is severe and usually constant, although it may be intermittent, and is associated with nausea, vomiting and extreme restlessness. The pain may be referred to these regions for a period ranging from one to twenty-four hours, but later is confined to the iliac fossa, where it manifests itself in wave-like paroxysms. With the advent of general peritonitis the pain becomes diffused. The nausea and vomiting usually cease in favorable cases after the pain is referred to the region of the appendix. In unfavorable cases it becomes regurgitant and persists until the end.

Rigidity of the abdominal walls, which in the majority of cases is most marked on the right side, occurs before the pain localizes itself in the right iliac fossa.

There is usually constipation, but occasionally diarrhœa. Where constipation persists it is due to one of two causes, either an intestinal paresis of septic origin or the use of opium.

Tenderness is the most important symptom of appendiceal inflammation. Deep palpation over an abnormal appendix will always elicit tenderness. There is only one condition which renders difficult or impossible the palpation of an appendix, viz., marked tympanites. Tenderness may also be elicited through the rectum in the male and the vagina and rectum in the female when the appendix is directed into the pelvis.

The point of greatest intensity of the tenderness is over the inflamed appendix. Excruciating tenderness indicates pus, and in some cases is elicited only by vaginal or rectal examination.

Temperature and pulse-rate in moderately severe cases bear no relation to the amount of disease going on within. I have seen cases with abscess and even perforation in which the pulse-rate and temperature were normal. A sudden fall of temperature in acute cases should be looked upon with suspicion, as this only too often indicates perforation of the appendix.

The ordinary form of appendicitis is readily diagnosed. But I have met with some variations which have been misleading and puzzling, cases in which the pain has been referred to the left side, to the spleen, to the bladder, and to the testicle.

The history of attacks is at times indistinct, frequently only a story of vague symptoms which patients refer to as an attack of cholera morbus. Again, I have seen cases in which a persistent colitis, or entero-colitis, were the only clues to the real cause of the trouble. There is one symptom, however, which is constant, and that is tenderness, which in the majority of cases is accompanied by a palpably enlarged appendix. If the physician palpates the the right abdomen of the patients who suffer from dyspepsia, entero-colitis, or colitis, with or without histories of attacks of appendicitis, the number of tender, enlarged vermiform appendices he discovers will astonish him. The following case will illustrate: Miss W.,

aged sixteen years. No history of an attack of acute appendicitis. Had been suffering for some time from a severe colitis. Her appendix was tender and was easily palpable. I advised its removal. We found the appendix constricted and indurated at its extreme tip, bound by adhesions to the surrounding bowel, and the omentum adherent to the outer wall of the cæcum. The appendix contained pus. I have come to the conclusion of accepting many of the histories of attacks of cholera morbus as those of acute attacks of appendicitis, and have yet to see the first operative case presenting such a history which did not substantiate this belief.

The diagnosis of appendicitis can be made early, and when made should be followed by operation for the removal of the inflamed organ. A case of *bona fide* appendicitis should not be allowed to go to the point of suppuration. A point upon which all authorities on this much-debated question agree is that there is no sign or symptom, class of individuals, age, or time of disease which foretells perforation, gangrene, and pus. No man can tell how the case may proceed from hour to hour, and therefore the only logical conclusion at which one of experience can arrive is immediate early operation.

The prognosis depends not only upon the character of the attack and the complications which may supervene, but especially upon whether or not an early operation is done—in other words, the earlier the operation is performed the better the prognosis.

When the collection of pus is circumscribed, and the general peritoneal cavity walled off, the prognosis is generally favorable. If the general peritoneal cavity be infected the prognosis is grave, although if operation is at once resorted to there is a possible chance of recovery; while if the infection be late or operation deferred a fatal termination is invariably the rule. When a circumscribed appendiceal abscess ruptures and evacuates its contents into the bowel recovery from the attack usually follows, while evacuation into the bladder is fatal in about 50 per cent. of the cases. The age of the patient is a decided factor in the prognosis, as the disease is more fatal in the very young on account of the slight powers of resistance.

*Treatment.* Appendicitis is a surgical affection, and should be so treated. The first question which arises after the diagnosis has been established is the character of the attack and what will be the probable outcome. It is here that we come up against the stone-wall of fact backed up with logical conclusion based upon experience. We cannot say positively which case or class of cases will recover from an attack and which will go on to suppuration, gangrene, and perforation. The question is, *Shall we guess and run the risk at the patient's expense, or will we accept the only alternative and remove the organ in the incipency of its inflammation?* The operation has been performed so often by skilled surgeons with a mortality of 1 to 2 per cent., and in many instances without a death, that there is absolutely no ground for attacking



the procedure upon the score of fatality. Hernia is not a frequent sequence of abdominal section, and is not the bugbear it is thought to be by the opponents of the knife. We cannot accept objections to scientific procedure upon the score of prejudice or on general principles, but must meet facts with facts.

A record of 100 appendicectomies with one death and no hernias speaks for itself. The records of McBurney, of New York; Richardson, of Boston; Fowler, of New York; Murphy, of Chicago, and many others, stand out like the "handwriting on the wall" to substantiate the scientific wisdom of early operation, and to stamp delay as dangerous and unscientific.

Early operation is a conservative and not a radical procedure. We are not governed by the same reasons that influence us to perform the radical operation for the cure of simple hernia, or for the removal of the uterine appendages for a fibroid. But we see before us the probable consequences of allowing suppuration, gangrene, and perforation to occur in the peritoneal cavity, which may or may not be protected by Nature's kindly action.

The proportion of cases of appendicitis which have one attack and then become perfectly well and are cured of the disease is so infinitely small, compared to those which have repeated attacks with an interval of invalidism, that I do not believe the rare exception should interfere with the rule.

One of my recent cases had three attacks with the interval filled in with gastro-intestinal uneasiness and tenderness over the appendix, increased by the slightest dietary indiscretion. He decided that he would be operated upon, as he considered the risk of another attack far greater than that of operation. On the day of the operation he remarked that the tenderness was less pronounced than at any time for three months previous.

The appendix, which lay behind the cæcum and colon, first observed a northerly and then a southerly direction, making an acute flexion; it was firmly bound down by strong adhesions. The omentum was adherent to the base of the organ as well as to the cæcum. An interesting feature in the case was the presence of a neighboring knuckle of small bowel, which was anchored to the base of the appendix by an adhesive band causing an acute flexion. This condition would have been capable of producing an attack of acute mechanical intestinal obstruction upon the slightest provocation.

The appendix was thickened and contained pus. It is now four weeks since the operation, and he says he has no dyspeptic trouble and feels the first relief since his initial attack nine months ago.

The early operation is, as a rule, a comparatively simple abdominal procedure.

The operation at the end of an attack, or during the interval between attacks, is usually more difficult than when done very early in the attack before adhesions are formed. After pus has formed an operation for the



removal of the appendix calls for the best judgment and skill, associated with experience in this particular line of work. The operator meets with pus which has originated in an appendiceal inflammation in every conceivable part of the peritoneal cavity, and only too frequently the entire cavity is invaded.

The appendix holds a northerly position in so large a percentage of cases that it is common to meet with many cases of acute appendicitis in which the purulent collection is post-cæcal, or post-cæcal and post-colic. In this class of cases I invariably remove the appendix. With the proper abdominal technique, an important part of which is the disposition of the sterile-gauze by which the greater peritoneal cavity is temporarily sealed off, the risk of infecting the peritoneum is reduced to a minimum. To one whose experience in this class of cases has made him ~~almost~~<sup>well</sup> expert, I would strongly urge that, having opened the peritoneum in cases of this character and recognizing the position of the swelling, it is far safer for him to immediately close the abdominal wound and complete the operation by draining the collection through the loin space.

This is not only feasible, but at the same time safer than to take the chances of exposing the peritoneum to contact with pus of the character which is generated in connection with appendicitis. In those cases where the abscess points anterior, one of two procedures is to be followed out, evacuation without any attempt to remove the appendix, or first carrying an incision through the abdominal wall to the inner side of the collection, in this manner opening the general peritoneal cavity, which is to be protected with sterile-gauze, to be followed by a second incision down over the most prominent part of the swelling. The pus is evacuated, the cavity then washed out thoroughly, and the appendix removed. This latter plan of operation should only be practised by a surgeon who is an adept in this line of work.

When the general peritoneal cavity has been protected in the manner referred to, the appendix removed, and the wound cleansed, the first packing of gauze is to be withdrawn and replaced by a fresh piece, which is allowed to remain *in situ* for two or three days, the time depending upon circumstances. By a strict observance of this step in the technique, the peritoneum can be left permanently sealed off. This anticipates Nature's means of closing off the abscess cavity by adhesive inflammation. When the permanent gauze packing has been removed the wound is closed by sutures introduced at the time of the operation.

I do not consider the evacuation of an appendiceal abscess without removal of the appendix in any way curative. On the contrary, experience has taught me that these cases are equally liable to recurrent attacks. I have operated for removal of the appendix upon too many cases with such a history to regard the simple evacuation of the pus other than merely palliative. Cases in which the abscess has ruptured into the colon or rectum, suffer from subsequent attacks, and to relieve these I have re-

moved the appendix during the quiescent period. In only a small percentage of the appendices removed under these circumstances do we find evidence of a previous perforation. From our knowledge of the pathology of this subject we know that perforation is not necessary for pus-formation.

I take this opportunity of adding a remonstrance against the median incision in the operation of appendicitis. The number of cases are limited in which this route offers any advantage. In the majority of cases, therefore, and from this we must reason, it is contraindicated first on anatomical grounds, second on the ground that the peritoneal cavity cannot be so well protected against infection. Granting that what I have said is true, the median operation is unsurgical. A knowledge of the topographical relations of the appendix must impress our minds with the fallacy of the median operation.

In suppurative cases it is impossible to open and drain an abscess in the right iliac fossa through a median incision, no matter how large, without infecting the peritoneal cavity. A large incision is always to be avoided in abdominal work. Where the appendix lies to the outer side of the cæcum, or behind the cæcum or colon, the difficulties of this route would be increased. To gain access to the retro-colic space by way of the median incision would probably call for division of the internal layer of the ascending meso-colon, always to be avoided, as it is preferable to go through the outer layer of the meso-colon on account of the relation the bloodvessels hold to the former.

The two incisions to be considered are through or immediately to the inner side of the linea semilunaris (not cutting the rectus, but pushing it inward) or through the abdominal walls, after the method proposed by McBurney.

The McBurney operation, which offers a better safeguard against ventral hernia, is especially adapted to chronic cases. With McBurney, I would not recommend it to one who has not had a considerable experience in appendiceal work, as it is more difficult to perform than the operation through the semilunar line. In either operation the incision should be small. In the McBurney operation the incision through the internal oblique, the transversalis muscle, the transversalis fascia, and the peritoneum is of necessity small. Ordinarily, in cases of chronic appendicitis, the incision in the peritoneum need not be more than an inch in length, just sufficient to admit the index finger to pick up the cæcum, the landmark in finding the appendix.

The medical clinician carefully views and studies the exterior of the abdomen, and upon the information thus gathered bases his conclusion as to what may be going on within. The surgeon sees the process, and if he has had a large experience sees so much of the destructive possibilities of the disease that he naturally comes to the conclusion that an inflamed appendix is better in the laboratory.





